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THE CABBAGE SEED STALK WEEVIL (*CEUTORHYNCHUS QUADRIDENS* PANZER)
AN IMPORTANT PEST OF CABBAGE SEED PLANTS ON LONG ISLAND.

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The cabbage seed stalk weevil is a European insect. Panzer (1796)¹ first described the species. Goureau (1866)² found the larvae living within the roots of rape. Perris (1877)³ reported water cress and mustard as host plants for the larvae. Lind et al (1914)⁴ found it occurring comparatively common in seed cauliflower and turpiper in Denmark. According to Redtenbacher⁵ it occurs on rape in Austria and Bargagli⁶ reports it on the flowers of horse radish and cabbage.

Slingerland (1894)⁷ reported it first in the United States as infesting cabbage seed stalks on Long Island. It was later reported⁸ from Nantucket, Mass., hussets. Sirrine (1895)⁹ observed it on seed plants of kale, cabbage and turnip on Long Island. Specimens were sent to Dietz who described it as a new species (*Ceutorhynchus seriesetosus*). Chittenden (1901)¹⁰ identified specimens for Slingerland as *C. quadrident* Panzer. Schwartz later confirmed this identification.

There is little information in literature regarding the life history of this insect. Slingerland (1894)⁷ reared adults from larvae found in cabbage seed stalks. These adults are the same as were later identified by Chittenden (Preserved in Cornell University Entomological Collection).

During the season of 1920 the author had the opportunity to observe this seed stalk weevil in the cabbage fields in the vicinity of Mattituck, Long Island, N. Y. Eggs were found first in the field on May 18th. They were deposited on the under side of the mid-rib of young and old cabbage leaves. Nearly every plant contained eggs. No larvae were found at this time. Although egg laying continued until May 26th the method of oviposition was not observed. The eggs were laid in punctures, the number in each puncture varying from three to seven. The tissue surrounding the puncture makes very rapid growth, thus forming a very conspicuous scar. The eggs are white, elliptical and about one millimeter in length. Each egg has at one end a slender pedicel which is about one-half millimeter in length. This attachment of the egg is very

¹ Faunae Germanicae, Heft 36, p. 13, 1796.

² Annales de la Societe Entomologique de France, Vol. vi., p. 171-172, 1866.

³ Larves de Coleopteres, 1877, p. 408.

⁴ 79 Beretning fra Staten Forsogsvirksamtid i Plantkulture Copenhagen, No. 30, 1914.

⁵ Fauna Austriaca, Vol. 11, p. 344.

⁶ Ibid, page 264.

⁷ Cornell Agr. Exp. Sta. Bulletin 78, 1894.

⁸ Transactions of American Entomological Society 1896, p. 422.

⁹ New York Agr. Exp. Sta. Rept. 1896, p. 603.

¹⁰ Notes of Slingerland. Cornell University Exp. No. 455.

*Contribution from the Entomological Laboratory, Cornell University.

fragile. Observations made on material collected showed the eggs hatched in about four days. According to this observation the egg laying period doubtless began at least by May 16th.

The larvae enter the mid-rib through the puncture. They burrow in the mid-ribs and extend their work down to the pith of the branches and main stalk. Instances were observed where more than thirty larvae were found in a leaf mid-rib two and one-half inches in length and one hundred and fifty in a single plant. The larval period occupied about ten days, after which they emerge from the stalk by boring small holes in the side of the stalk or branch. Doubtless each hole serves as a means of escape for several larvae as there are apparently more larvae in a stalk than holes. The larvae drop to the ground and pupate.

The mature larva measures 4-5 mm., legless, white. Head lemon yellow with dark brown tipped mandibles. The body is composed of 12 easily recognized segments, each segment, especially those of the abdomen, is marked with distinct ridges.

Pupation occurs near the surface of the soil in brown, fragile pupal cells made of earthen material. Each cell measures 5mm. in length. The pupal period occupies about ten days. The pupa measures 3mm; white; scattered over the thorax, head, beak and tip of femora are prominent brown spines. These spines serve to keep the delicate pupa from touching the roughened surface of the pupal cell. Shortly after pupation the eyes become jet black. As the pupa grows older it gradually becomes darker.

The adults of the seed stalk weevil were found in the field from June 16 to July 10th. They are rather difficult to observe, due to the minuteness, color and habit of "playing possum" upon the least disturbance. They can be readily observed during the fore part of a still, warm day on the upper branches and in the axils of the leaves of the seed stalks.

Blatchley and Leng give a good description of the cabbage seed stalk weevil in "Rhyncophora of North America" p. 443.

The insect undoubtedly hibernates as an adult although no trace of it could be found after it had disappeared from the fields in July.

In general the cabbage seed growers on Long Island either failed to recognize this insect or confused it with the larval stage of the common cabbage maggot (*Phorbia brassicae* Bouche). It is due to this confusion that little information has been secured concerning its distribution and destructiveness in the past.

The distribution of this weevil in the cabbage seed field in the vicinity of Mattituck seemed quite general during the past season. The information collected was taken from a comparatively few fields although characteristic signs of the presence of the insect were seen in nearly every field in that vicinity.

The losses to the cabbage seed grower are due to the larvae burrowing in the pith of the main stalks and branches thus weakening the plant and causing it to break over or die prematurely. In either case the quantity and quality of seed produced by an infested plant is inferior to that of a plant not infested.

In order to learn to what extent the weevil occurs and to determine the losses caused by it, counts were made in five fields. It was found that forty-seven

percent of the plants were injured to some degree. At harvest time one hundred normal plants and an equal number of plants attacked by the insect were threshed. The amounts of seed secured, both before and after cleaning, are given in the following table:

One hundred plants each	Weight of seed before cleaning	Weight of seed after cleaning	Percent of seed lost in cleaning
Not Infested	109.2 oz.	97.4 oz.	11
Infested	74.3 oz.	64.8 oz.	13
Loss due to insect		32.6 oz.	

Plants not attacked by the insect therefore yielded practically thirty-three and one-half per cent. more seed than the attacked plants. Since there were forty-seven per cent. of the plants attacked by the insect the loss would be sixteen per cent. of the crop. The seed yield was approximately two hundred and fifty pounds per acre this year, and consequently the loss occasioned by the weevil was forty pounds per acre valued at fifty dollars (1920). Even greater losses have doubtless occurred since a cabbage seed contractor and some growers have cited instances where in previous years this insect has occasioned the loss of entire crops.

NEW SPECIES OF SYRPHIDAE (DIPTERA)

BY C. HOWARD CURRAN,
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Syrphus invigorus, new species.

Eyes bare; face yellow, cheeks and oral margin black; no facial stripe; first and third abdominal bands interrupted, the second entire. Length 10-11 mm.

Male. Face and sides of front reddish yellow; cheeks, oral margin and sides of the face, reaching to the tubercle, brownish black, posterior oral border reddish yellow; face finely white pilose and more or less whitish pubescent; tubercle rather large, the epistoma not at all produced; front black in the middle; frontal pile yellowish or sometimes brownish, of the vertex, black, of posterior orbits, white; eyes bare. Antennae reddish yellow or orange, more or less brownish above; arista reddish brown.

Thorax shining greenish black, with pallid yellowish white pile, more yellow along the lateral margins before the suture, and almost white on the pleurae. Scutellum translucent pale yellowish brown the base and sides black; pile whitish.

Abdomen opaque black, the first segment and complete borders of the following segments, the lateral margins more narrowly, shining black, sometimes with a greenish tinge. Second segment with a large triangular spot in the middle on each side; third segment with an abbreviated yellow band moderately separated from the anterior margin, deeply incised posteriorly (about half through) and usually with a small triangular projection in the middle anteriorly; the band is broadest laterally and is narrowly separated from the lateral margins. Band on fourth segment similar, but moderately interrupted in the middle, the inner ends of the spots formed being almost evenly rounded posteriorly to the lateral fourth; apex of third segment in the middle and base of fourth at the sides, narrowly yellow; apex of fourth segment and triangles on the basal

corners of the fifth more broadly reddish yellow. None of the bands reach the lateral margins. Pile yellowish white or white on base of abdomen, rather long; dusky along the margins, the apical half of third to fifth segments with blackish pile laterally; opaque areas, except the base, with shorter black pile; yellow bands with yellow pile. Abdomen rather slender; only a little oval.

Legs reddish yellow; basal half of the front four femora, and three-fourths of the hind femora, an obscure ring on the apical third of the hind tibiae, and the hind tarsi apically, reddish brown. Wings slightly tinged with luteous; stigma and sub-costal cells luteous, and base of wings more or less so. Squamae bare.

Holotype, male, Orillia, Ontario, May 30, 1920, two *paratypes*, same date, taken by the author, poising above small maple tree in opening in deep woods. Types in author's collection.

***Syrphus americanus* var. *vinelandi* n. var.**

Length 9-10mm. Differs from typical *S. americanus* as follows:

The yellow bands in both sexes are narrower, being not wider than the black.

Female: Hind femora black at the base; front more broadly shining black in the middle, and the width at the vertex apparently slightly less; fifth abdominal segment more black.

Male: The spots above the roots of the antennæ are larger and darker than in most specimens of *americanus*; the black of the cheeks is usually connected to the black facial stripe along the oral margin by a brown or black stripe.

This variety seems to approach *S. nitens* much more closely than typical *americanus*, as the bands are usually more emarginate behind.

30 specimens from Ontario and four from Wisconsin. Types in the Museum of the California Academy of Sciences.

The great difference in the larvæ of the typical species and the variety would seem to indicate two distinct species, but it is impossible to distinguish many males, and even some females have the base of the hind femora only brownish. The larvæ are green with an irregular brownish blotch on the dorsum, while in typical *americanus* they are yellowish brown or grayish brown with very much more numerous small spines.

***Syrphus americanus* var. *pomus* n. var.**

This variety is very similar to the above, but the size is only 7 to 8mm. and the color is darker throughout. The abdominal bands are slightly narrower, the oral margin is more broadly darker and the legs are darker. I can find no good characters for separating the two varieties, but the larvæ are very different.

Larvæ pale grayish yellow, the dorsum more brownish and with somewhat fewer small spines than in typical *americanus*. The larvæ are the only ones I have observed living exposed to the sun. They feed upon *Aphis pomi* but are not abundant.

Holotype and *allotype* in the author's collection.

***Syrphus rubripleuralis*, new species.**

Habitat, California.

Eyes bare: abdomen with only two crossbands, situated on third and fourth segments; sides of abdomen nearly parallel.

Length, 8.5mm. Female. Face dull yellow, the tubercle, oral margin and cheeks reddish brown; in profile gently concave below the antennal prominence to the tip of the prominent tubercle thence somewhat triangularly excavated to the tip of the slightly prominent epistoma; pile fine, sparse, whitish. Antennae reddish ferruginous, brownish above; arista reddish, rather stout. Front dull black, above, and a central longitudinal area, shining; above the antennae with an arch similar in color to the face and connecting at the sides with the facial ground color; immediately above the antennae, piceous; pile black, rather dense; posterior orbits silvery pollinose. The width at the vertex is about one-third the width at the antennae.

Thorax shining black, the mesopleuræ obscurely reddish posteriorly; pile white, long and silvery on the pleuræ. Scutellum yellow, its base and margin narrowly black, its pile black, and longer than on the thorax.

Abdomen more slender than the thorax, elongate, opaque black, the first segment, anterior third of the second, and the lateral margins of the whole abdomen, shining greenish black; pile long and silvery on the basal two segments, on the lateral margins sparse, whitish or grayish, on the yellow bands yellowish, elsewhere, black, shorter. Third and fourth segments with a narrow, yellowish red band, separated from the anterior margin by about the width of the band, and narrowly separated from the lateral margins; the bands are narrowest in the middle, gradually increasing in width to their ends. In some lights the lateral margins of the apical half of the abdomen appear reddish and the sides of the first segment luteous.

Legs brownish red; base of the front four femora, tips of the tarsi, and the hind legs chiefly, more reddish brown.

Wings hyaline, stigma luteous; spurious vein unusually well developed, rising from the second vein just before the base of the third longitudinal vein and almost united at its apical end with the fourth vein just before the junction of the fourth and fifth veins. Anterior cross-vein almost rectangular and placed about one fourth the distance from the base of the discal cell. Subcostal cell yellow-luteous.

Holotype, female, Mt. Wilson, Cal., Oct. 18, 1917, (E. P. VanDuzee), in the Museum of the California Academy of Sciences.

This species is rather striking and reminds one of *Melanostoma*. If Matsumari's classification were accepted, it would form a new genus near *Syrphus*, because of the position of the anterior cross-vein, and the slender abdomen. Matsumari's genera seem much too artificial to be accepted and I cannot agree with him, therefore I leave the present species in the genus *Syrphus*.

***Sphaerophoria cranbrookensis*, new species.**

Swollen portion of the hypopygium almost circular in outline when viewed from above; terminal plates very short, about four times broader than long, the apical pile not dense, directed forwards, rather long, yellow. Abdomen deep shining black, with reddish yellow bands.

Length, 10mm. Male. Face and front creamy yellow, the middle of the face and oral margin translucent: face with inconspicuous pile, front with short, sparse, pallid pile. Antennae yellow: third joint above, and the arista, black. Vertical triangle with long black pile. Cheeks blackish, a yellow spot below the eyes. Posterior orbits blackish, with grayish pollen and silvery pile on the lower half, yellow pollen and black and yellow pile intermixed on the upper half.

Thorax metallic greenish black, with tawny pile; lateral stripes broad, whitish, to the suture, thence indistinct to the post alar callosities. A spot above the front coxae, a large mesopleural spot and a smaller one below it, and the sterno-pleurae, yellowish white. Scutellum pale yellow, with black pile.

Abdomen shining black, its lateral margins narrowly yellow; second segment with a moderately narrow arched band about the middle, the ends narrowed slightly towards the margin, where it connects with the yellow margin, a small triangular notch in the middle of the yellow band. Third segment with similar, but slightly broader band, except that there is a slight projection posteriorly on each side of the median notch. The third band is much narrower on the lateral quarter, more deeply notched medially, and more produced posteriorly on each side of the notch. Fifth segment yellowish red, with a small median triangular black dash and a large black spot on each side, reaching nearly to the hind margin. Hypopygium as described above.

Legs pale yellowish, with appressed black pile; tarsi reddish.

Wings hyaline. Squamae yellowish with a blackish or reddish border and short reddish pile.

Holotype, male, Cranbrook, B. C., May 25, 1919, collected by C. B. D. Garrett, in the collection of Mr. Garrett.

***Ceria ontarioensis*, new species.**

Very much like *C. abbreviata* superficially but without the antennal pedicel, and with U's on the third and fourth abdominal segments; differs from *C. signifera* in having black legs and different arrangement of yellow on the face, etc.

Female. Length, about 10.5mm. Face black, with a broad obtusely conical spot on each side below the antennae connecting broadly on the sides with an elongate spot at the orbits which runs downwards towards the oral margin about four-fifths of the distance, the two stripes converging below; above these, small round orbital spots opposite the antennae, an obscure median facial stripe and an obscure arcuate spot on the cheeks, its rounded side towards the front, yellow. Face almost perpendicular in profile, a little convex above the oral margin. Front black, with an interrupted abbreviated, yellow arcuate spot above the antennae in a reddish brown field. Eyes separated by the width of one eye. Posterior orbits black with yellowish pollen bordering the eyes. Pile short, sparse, pale whitish, confined to the cheeks and posterior orbits. Antennae black, the first joint luteous on the basal half. Antennal process oval, very short, luteous about the antennal base.

Thorax dull black, finely scrobiculate, with inconspicuous short black hairs; the humeri, a cordate spot in front of the suture at the sides, a vitula running from the post alar callosities to the suture and curving inwards about

the middle, a small spot inside its anterior end, an elongate spot on the mesopleura and a small roundish one below, yellow, pleurae shining. Scutellum yellow, its base and sides black.

Abdomen shining black, with short inconspicuous black pile, the fourth segment with yellow pile, and longer yellowish pile on the sides of the basal two segments. Second segment much narrowed basally, forming a rounded sub-carinate swollen area at the base above; on each side with an elongate basal spot. Second to fourth segments with the apices yellow, the anterior yellow band broadest, that on the fourth segment narrowest; in addition, on each side of the third and fourth segments a yellow U, the convexity behind, those on the third segment with the inner arm obsolete.

Legs black; trochanters and base of femora, ends of femora and broad bases of the tibiae and their apices, and the first two or three joints of the front four tarsi, yellow or luteous; femora with double rows of small spines on apical half or quarter.

Wings hyaline, brown in front, more yellowish basally, third vein with a long stump of vein into the first posterior cell about its middle; the brown color extends further into the first posterior cell beyond this stump of vein.

Holotype, female, Orillia, Ontario, May 30, 1920, collected by the author and in his collection.

Ceria cylindrica, new species.

Length, 15mm. Male. Eyes over twice as high as wide; abdomen black, with broad yellow segmental apices and elongate yellow triangular spot on each side of the second segment, reaching almost to the yellow apex.

Male. Face and front yellow, the former separated from the latter by a slightly darker curved line reaching from antennal base to the eyes. Face with a median brown stripe enclosing a narrow yellow line, and the antennal process brown; cheeks shining black, narrowly connected along oral margin with median brown stripe. Face in profile conically produced downwards, very gently convex; the apex of the oral margin is almost as far below the lower border of the eyes as the antennal process is above. Antennal peduncle broadest at apex when viewed dorsally, with a shallow longitudinal median line and a sub-apical depression or groove; not as long as broad; viewed laterally it is slightly longer than broad, being compressed, so that it is about one-third as thick when viewed laterally as dorsally. Antennae opaque brown, third joint opaque black, style yellow, with silvery pubescence, first joint obscurely luteous basally, longer than the second, third joint slightly shorter than the second. Vertical triangle yellow, the ocellar tubercle black; posterior orbits black with yellow pollen along the eyes; pile, only on cheeks and posterior orbits, sparse, yellow, shorter above.

Thorax finely scrobiculate, with extremely short black pile, slightly shining black; the humeri, a spot at each end of the suture, a small, indistinct spot on each side of the middle of the suture; a stripe running from the post alar callosities almost to the suture, the mesopleura and a spot below, yellow, post alar callosities reddish, with yellow pile; pleurae with inconspicuous yellow pile.

Scutellum yellow with a complete border of black, slightly over twice as wide as long.

Abdomen slightly shining black, finely scrobiculate; first and second segments fused, with short black pile on the disc and yellowish pile on the sides; on the sides with an elongate yellow triangle reaching almost to the yellow hind margin, the inner points well separated. Apices of the two following segments increasingly broadly yellow, the yellow on the fourth segment occupying nearly one-third the segment, its anterior angle being bi-convex on each side of the median notch; pile yellow; on each side of the third and fourth segments a moderately prominent gray pollinose stripe reaching from near the median anterior portion of the segment to a point about one-third from the apex and one-fourth from the lateral margins. Hypopygium black, with black pile. In outline the abdomen is slightly narrowed to the apex of the first segment, thence gradually widened to the apex of the fourth, where it is about the same width as at the base. The fifth segment and hypopygium are almost concealed by the fourth segment.

Legs reddish yellow, the last two or three tarsi joints brownish; apical half of hind femora and a broad pre-apical band on the hind tibiae brownish. Wings pale brownish anteriorly, hyaline posteriorly.

Holotype, male, "Fallen Leaf;—L. Tahoe, Cal., July 15, 1915," (E. C. Van Dyke,) in the Museum of the California Academy of Sciences.

THE CANADIAN SPECIES OF THE GENUS ANOMOGYNA (LEPID.)

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Omitting the two North American species *infimatis* Grt. and *vernalis* Grt., which may in any case prove to be not strictly congeneric, the genus *Anomogyna* Staud. has been employed by Hampson (1903, Cat. Lep. Phal. Brit. Mus. IV., 588) for a few subarctic European species of Agrotinæ of considerable rarity.

Two of these species, *laetabilis* Zett. and *sincera* H.S., have long been placed on our North American lists as occurring in Labrador, presumably on the strength of H. B. Moeschler's identification, who in his time was in receipt of large collections from this region. To North American lepidopterists, however, the species have remained practically unknown until of quite recent years.

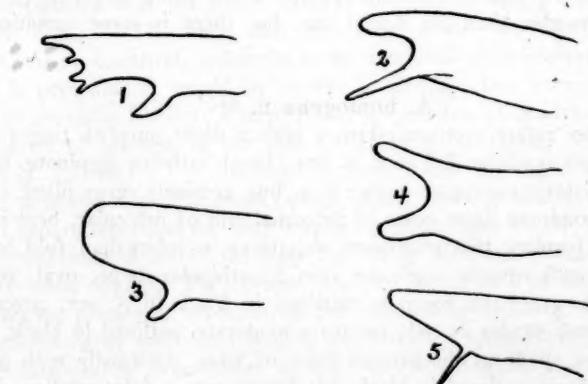
The examination of a series of specimens of this group from the Barnes Collection and that of Mr. K. Bowman of Edmonton, together with specimens contained in the Wolley-Dod and the Canadian National Collections, shows conclusively that there are more species belonging to the group in North America than has been supposed and that these species can be very readily separated from one another by the terminal portion of the claspers (valvæ) of the male genitalia.

As defined by Hampson *Anomogyna* Staud. (type *laetabilis* Zett.) differs from *Aplectoides* Butl. (type *condita* Gn.) in the absence of spines on the fore tibiae. According to the male genitalia there is evidently a close relationship between the species of *Anomogyna* and certain ones included by Hampson in *Aplectoides*, notably *speciosa* Hbn. and *imperita* Hbn., and it is a matter of considerable doubt to me whether in these cases the generic separation will hold;

*Contribution from the Entomological Branch, Dept. of Agriculture, Ottawa.

in this connection I might mention that while the fore-tibial spines are quite clearly seen in European specimens of *speciosa* and its race *arctica*, in several North American specimens from Mt. Washington, N.H., before me I have been quite unable to detect them although the genitalia present no differences which would indicate specific distinctness.

It is further of interest to note that *Aplectoides* Butl. may possibly fall to *Pteroscia* Morr. (1874, Proc. Bost. Soc. Nat. Hist., XVII., 155). This genus was based on the single species *atrata* Morr. from Mt. Washington, N.H., a species omitted by Hampson in his catalogue and wrongly included under *Agrotis* in the Barnes and McDunnough Check List, 1917, on account of the superficial resemblance to the *unimacula* group. An MSS. note by Dod, who carefully examined the British Museum specimen, states that the species looks like an Alpine *Aplectoides* and is closely related to *speciosa*; this reference I thoroughly agree with after an examination of a ♀ specimen recently received by the National Collection from Larder Lake, Ontario, and which seems to be an undoubted *atrata*. If *condita* and *atrata*, the types of the two genera in question, prove congeneric, *Pteroscia* will have priority. The correct generic relationships of the entire Agrotid group require however a much more detailed study than I now am able to give and I shall confine myself in the present paper to a few remarks on the various species.



Terminal portion of right claspers of (1) *A. partita* n. sp. (2) *A. sincera* H.S. (3) *A. homogena* n. sp. (4) *A. laetabilis* Zett. (5) *P. yukona* n. sp.

A. sincera H. S.

I have recently recorded (Can. Ent. liii., 84) the receipt of a very fine male specimen from Hopedale, Labrador, which is now in the National Collection, through the kindness of Dr. E. M. Walker. It matches so excellently the figure given in Seitz, Macrolepidoptera, Fauna Palaearctica, Vol. III., Pl. XIII. k, that even without European material for comparison I feel reasonably sure of the identification. A single worn specimen labelled Labrador is in the Barnes Collection ex. Coll. J. Doll, and very possibly was the one examined by J. B. Smith in his Agrotid revision, as it is evidently from a German collector and has had a portion of the left clasper removed, as was Smith's custom. Mr. Bowman

possesses a very fine specimen from Nordegg, Alta., and a worn one captured at Pocahontas, Alta.; the species may therefore be expected to occur throughout the entire northern portion of Canada. The terminal dorsal portion of the left clasper is narrow and rounded; the ventral edge is terminated by a long, sharp spine (fig. 2).

A. *laetabilis* Zett.

Of late years the species has not been rare. It was first reported from Atlin, B.C., by E. M. Anderson, who collected in this region in 1914 (Rep. Prov. Mus. B.C. for 1915, 17, Pl. IX., figs. 9, 10).

Since then numerous specimens have been received by Dr. Wm. Barnes from Okak, Hopedale and Nain, Labrador, and several specimens were collected by Mr. J. B. Wallis, of Winnipeg, in 1917 on the Piquitenay River, Mile 214, Hudson Bay R. R. A very large specimen, rather browner than usual, is contained in the Dod collection from St. Anthony, Newfoundland. Messrs. Bowman and Whitehouse have each taken single specimens in tamarack swamps at Nordegg and Reddeer, Alta., the latter specimen being similar to the Newfoundland one.

These specimens all agree in genitalic characters with a Lapland specimen in the Dod Collection; the distal portion of the clasper is bifid (fig. 4), each prong being bluntly rounded terminally; the ventral prong is generally somewhat shorter and broader than the dorsal one, but there is some variation in this respect.

A. *homogena* n. sp.

Primaries rather even gray-brown with a slight purplish tinge; a distinct black basal dash reaching 2/3 to t. a. line; basal half-line geminate, filled with pale gray, indistinct except at costa; t. a. line geminate, gray-filled, outwardly oblique and prominent from costa to proximal end of orbicular, bent inward at cell and then forming two prominent outcurves in submedian fold and above inner margin with inward angle on vein 1; orbicular large, oval, recumbent, filled with pale gray and partially outlined in black in ♂ sex, preceded and followed by black shades in cell; reniform moderate, outlined in black, centrally filled with same shade as the ground color of wing, outwardly with paler ring of color; claviform outlined in black, not prominent; a faint median shade line passing between reniform and orbicular and then bent slightly inward; t. p. line geminate, dentate, pale filled, arising from dark spot on costa above reniform, well rounded outwardly opposite cell and then rigidly oblique to inner margin; s. t. line pale, angled outwardly below costa, then slightly sinuous, preceded below costa by several blackish dashes; similar dashes occur between veins 4 and 6 and slightly below 2; considerable pale gray shading in subterminal area and at apex of wing; broken blackish terminal line. Secondaries deep smoky, paler basally, with large discal spot and traces of curved median line; fringes paler. Beneath smoky with discal spot and curved median line on both wings. Expanse 38-40 mm.

Holotype, 1 ♂, Banff, Alberta, (Sanson), September 5, 1911, in Canadian National Collection.

Allotype, 1 ♀, Pocahontas, Alberta (K. Bowman), August 24, 1918, in Coll. Barnes.

Paratype, 1 ♂, Pocahontas, Alberta (K. Bowman), August 17, 1916, in Coll. Barnes.

A series of five specimens from Nordegg, Alta., is contained in the Bowman collection.

This species has been doubtfully recorded by Wolley-Dod (Can. Ent. XLVII., 7, 1915) under the name *gelida* var. *mevesi* Auriv. I have seen no authentic specimens of this race, but judging by existing figures hardly believe that the two forms are identical. The ♂ genitalia (fig. 3) are quite distinct from those of the two preceding species and closest superficially to those of *Aplectoides speciosa*; the clasper is broad and rounded distally and on the ventral surface a short distance anterior to the apex bears a thumb-like projection considerably larger than the similar projection found in *speciosa*.

Anomogyna (Aplectoides) beddeki Hamp.

Through the kindness of Mr. W. H. Tams of the British Museum I have received a sketch of the clasper of the ♂ type of this species; the terminal portion ends in a rather blunt point with a thumb-like projection on the ventral margin near apex; between this and the end of the clasper there are several irregular projections.

The unique type came from Doyles Cadroy valley, Newfoundland, and it is quite possible that the name *beddeki* will fall to *livalis* Sm. (1910, Jour. N.Y. Ent. Soc., XVIII., 86), also described from Newfoundland. Smith's species is, however, entirely unknown to me and until an opportunity of studying the type is presented it would be unsafe to cite the two names as synonyms. Judging by genitalia I believe I have found a specimen of *beddeki* mixed in with a small series of *speciosa* in the Dod Collection from Grand Gulf, Mt. Washington, N.H. (Swett). The specimen is considerably worn, but shows the small orbicular mentioned by Hampson, which, apart from genitalia, seems the best means of separation from the very similar *speciosa* form of the White Mts.

Five specimens before me from the Rocky Mts. are evidently very closely allied to *beddeki* Hamp. They differ, however, in the lack of any definite white shading on the primaries, especially in the terminal area, being rather uniformly dark olivaceous-gray with the filling of the ordinary spots slightly paler in color than the surrounding area; there is also no evident black basal streak. It is quite possible that these represent merely a western race of *beddeki*, as the type of genitalia is essentially similar, the claspers only differing in the minute detail of the apical margin, which is apparently by no means constant. Until more material is available for study I shall regard the above characters as being of good specific value.

A. partita n. sp.

Squamation rough, hairy. Primaries deep smoky, heavily overlaid, especially in median area, with pale olivaceous scaling amongst which are scattered black scales. Basal half line indistinct, black, bordered outwardly with pale olivaceous; t. a. line black, outwardly oblique and rather irregular from costa to submedian fold, then bent inward and forming a prominent inward angle on vein 1, broadly edged inwardly with pale color; orbicular small,

round, edged with black, pale-filled; reniform semilunate, edged with black, pale-filled; claviform a minute black loop; t. p. line strong, dentate, black, edged outwardly by pale color, bent outward below costa, then rather rigidly oblique to inner margin; s. t. line defined by paler terminal shading and preceded by dark dashes which form opposite cell a distinct dark patch; broken dark terminal line and checkered fringes. Secondaries smoky, paler basally with dark discal dot and traces of curved median line; terminal dark line, slightly broken; fringes pale. Beneath dull smoky with indistinct broad curved median shade on both wings as well as discal dots. Expanse 36-38 mm.

Holotype, 1 ♂, Banff, Alberta (J. B. Wallis), July 4th, in Canadian National Collection.

Paratypes, 2 ♂'s, Kaslo, B. C., July 24th, Aug. 7th (J. W. Cockle), in Canadian National Collection and Collection of Mr. Cockle. 2 ♂'s, Nordegg, Alta., June 23rd, July 20th (J. McDunnough), in Canadian National Collection.

Several other specimens from Nordegg are in the Bowman Collection.

The species is superficially similar to *speciosa* Hbn., but quite distinct in genitalia; in the holotype the distal end of the clasper (fig. 1) is drawn out to four points, of which the dorsal one is longest, and on the ventral margin a short distance from apex the clasper is furnished with a blunt curved projection somewhat similar to that of the preceding species; in the paratypes the middle teeth are reduced to mere knobs and the apical margin is shorter and more oblique, much closer in general appearance to the clasper of *beddeki* Hamp. The fore tibiae show only one or two spines in the distal area.

Among the specimens sent by Dr. Wm. Barnes were two specimens from Upper Ramparts, Yukon Territory, which are quite obviously allied to *atrata* Morr. and which apparently represent a paler, northern race of this species as I can detect no differences in the shape of the terminal portion of the clasper of the two forms.

Pteroscelia atrata yukona n. var.

Fore tibiae spined. Thorax an admixture of brown and gray scaling. Primaries rather light purplish-brown, distinctly shiny; maculation rather indistinct; t. a. line slightly darker than ground color, defined inwardly by pale ochreous shading, most prominent as a pale costal patch, slightly dentate in cell, well outcurved in submedian fold, angled inwardly on vein 1; orbicular minute, indistinct, pale-filled; reniform small, narrow, lunate, pale-filled; t. p. line prominently dentate, edged outwardly with pale ochreous, well rounded opposite cell and bent inward in submedian fold, approaching t. a. line closely at inner margin. Several pale dashes on costa between t. p. line and apex of wing and pale terminal dots on outer margin at extremity of veins; fringes concolorous. Secondaries pale smoky with faint discal dot and dark terminal line. Beneath pale smoky, primaries with noticeably darker fringes broken by pale dots, secondaries with dark terminal line; traces of discal dots and bent median line on all wings. Expanse 37 mm.

Holotype, 1 ♂, Upper Ramparts, Yukon Terr. (June 8th, 1917), in Collection Barnes.

Paratype, 1 ♂, Upper Ramparts, Yukon Terr., (July 17, 1917), in Canadian National Collection, through courtesy of Dr. Barnes.

The variety is much paler than the type form, which is purplish-black in color. The ♂ clasper (fig. 5) narrows rapidly at its distal end and bears a strong spine-like projection on its ventral side shortly before apex.

NOTES ON THE MORDELLIDAE OF THE UNITED STATES, WITH DESCRIPTIONS OF NEW SPECIES.

BY EMIL LILJEBLAD,
Chicago, Ill.

Note on sexual dimorphism in the Mordellidae.—Not only in *Tomaxia*, as described by Mr. C. A. Frost,* but also in many (and probably all) the species of *Mordella* and *Mordellistena*, a comb-like series of coarse setae is developed in each anterior femur of the male only. In all Mordellidae studied by the writer in this regard, the males are somewhat smaller and notably slenderer than the females. In at least two species of *Mordellistena* (*M. syntenia* and *M. pulchra*, as described below), there exists a sexual difference in the number of tibial ridges. In some species of the family, for example *Mordellistena pulchra* (q.v.), the sexes further differ in color.

1. *Dielidia inyoensis*, sp. nov.

Body elongate, nearly parallel in the male, more robust in the female; finely transversely-strigate. Head dark reddish-brown, mouth-parts fusco-testaceous, dark brown palpi excepted; eyes black; antennae reddish-brown, a little lighter toward the base; prothorax and elytra dark reddish-brown; under surfaces dark brown, except the prosternum in the male, which is much lighter-in color; legs testaceous in male, fusco-testaceous in female. Eyes granulate and rather deeply emarginate. Antennae with the first and second joints about equal in length, each one-fourth shorter than the third, which is a little shorter than the fourth, in the male; the third and fourth joints equal in the female, of about the same length as the second; sixth to tenth joints in both sexes about equal, each widening toward apex, and each shorter than the fifth; eleventh joint pointed at tip, twice as long as the tenth. Prothorax one-third wider than long, widest at base, its sides rapidly converging to apex, mesosternum compressed and slightly elevated; elytra as wide as thorax at base, rather abruptly rounded at apex, especially in the male; sixth ventral segment visible. The males have on each side of the oedeagus a rather long flattened, triangular appendage, rounded at apex, and with several setae (this, however, can only be seen if the genital organ is extruded). Length of male, 2mm.; of female, 2.25 mm. Breadth of male, 0.75 mm.; of female, 1.0.

Eight specimens examined, all from the Inyo Mountains, California, at an elevation of 7,000-9,000 feet; collected on July 7-11 by Prof. H. F. Wickham. The male holotype and female allotype are deposited in the writer's collection; paratypes in the collection of Prof. H. F. Wickham, from whom the specimens were received.

This species somewhat resembles *Anthobates fusculus* Lec., but the antennae are longer, and the third and fourth joints are about equal in length, the fourth not being reduced in size as it is in *Anthobates*.

2. *Diclidia gilva*, sp. nov.

Body subcuneate, nearly parallel; color entirely fulvous, except on the black eyes and the fuscous abdomen, finely transversely-strigate. Head comparatively large; eyes coarsely granulate and rather deeply emarginate. Antennae with the second joint a little shorter than the first; the third and fourth equal in length, each about as long as the first and second together; the fifth one-third shorter than the fourth; the sixth a little shorter and wider than the fifth; the eleventh joint twice as long as the tenth. Prothorax about one-third wider than long, as wide as the elytra at base; its sides converging toward the apex; mesosternum compressed and much elevated; elytra slightly tapering toward the apex and rounded at tip; sixth ventral segment visible, nearly truncate, or very slightly emarginate at apex. Two short and narrow appendages, pointed at tip, and covered with comparatively long setae, developed at tip of abdomen, presumably part of the oedeagus, as in *Diclidia inyoensis*. Length 2.5mm., breadth 1 mm.

Two specimens examined, both males, collected on the Inyo Mountains, California, at an elevation of 7,000-9,000 feet, on July 7-11, by Prof. H. F. Wickham.

The type is in the possession of the writer, the paratype is in the collection of Prof. H. F. Wickham.

This species is most closely related to *Diclidia greeni* Liljeblad,¹ from which it differs slightly in size and color, and notably in the shape of the abdominal appendages.

3. *Mordella pubescens*, sp. nov.

Body moderately elongate, very slightly cuneiform; entirely covered with rather coarse, stiff, sericeous-cinereous pubescence. Ground color mostly black, but the elytra with a double whitish spot, located at one-third the distance from apex to base. Head very finely punctate. Antennae short, not reaching middle of prothorax; third joint one-fifth longer than the fourth; the fifth, one-fifth longer than the fourth, but nearly twice as broad at apex, being strongly clavate; the sixth to tenth joints about equal in length, each being one-fourth shorter than the fifth, and strongly clavate; the eleventh joint one-third longer than the tenth, its sides slightly converging toward the apex. Last joint of maxillary palpi an isosceles triangle. Prothorax one-third broader than long, a little broader than the elytra at base; evenly rounded from base to apex, its hind angles obtuse, finely punctured, slightly canaliculate in the middle near the apex and with a very faint fovea each side of it; its base in front of scutellum very broadly rounded; scutellum triangular; under surfaces finely punctured. Anal style very short, comparatively broad, and blunt at tip. Length to end of the elytra 6 mm., to tip of the anal style 7 mm.

One specimen only, presumably a male, from Littleton, Colorado, collected on June 4 by Mr. C. A. Frost.

This species is most nearly allied to *Mordella quadri-punctata* Say., from which it differs markedly, in the much shorter form, and in the color of the elytral pubescence, which is brownish in *M. quadri-punctata*.

¹ Can. Ent. L, 1918, p. 153.

4. ***Mordella obliqua* Lec.**

The writer is of the opinion that this species, being valid, was wrongly placed by Smith² in the synonymy of *M. lunulata*. Three specimens agreeing closely with the original description³ have been examined; two of these are topotypes, collected by Mr. H. Dietrich at Odenton, Maryland, on June 16; the third was collected by Mr. T. H. Hubbell at Sawyer Dunes, Berrien County, Michigan, on July 9. These three differ from specimens typical of Helmuth's *lunulata*,⁴ in the form of the body, and of the anal style; in the relative lengths of the antennal segments; in the character of the pubescence, and in the marking of the elytra. As originally stated, *M. obliqua* bears considerable resemblance to *M. marginata*.

Mordella obliqua may be redescribed, on the basis of the material at hand, as follows:

Body short, elongate-oval in form. Color as originally described, except that the pubescence of the under surfaces is cinereous, and that the pubescence at the sides of the abdominal segments and of the pygidium is silvery; antennae and palpi, dark brown, palpi the lighter of the two. Antennae with third joint very little shorter than the fourth, and less dilated at apex; fifth joint one-third longer than the fourth and twice as broad at apex; sixth to tenth joints each about one-fourth shorter than the fifth, all moderately serrate. Last joint of maxillary palpi with the inner and outer sides nearly equal in length, the basal side one-half shorter.

5. ***Mordellistena quadrinotata*, sp. nov.**

Hind tibia with two oblique parallel ridges, the anterior one extending entirely across the outer face of the tibia; first joint of hind tarsus with three, second with two ridges; all ridges strongly marked.

Form nearly linear. Head testaceous, sparsely covered with cinereous pubescence; antennae testaceous, becoming a little fuscous on the four terminal joints; palpi a little darker than the head; eyes black; prothorax black with long flavo-testaceous pubescence, and a small ferruginous spot at the apical angle on each side; elytra black, with an oblique, oblong oval testaceous spot, extending from the humeral angle one-third of the distance to tip of elytra, but not reaching the suture, and one small pale spot, located in the middle of each elytron, one-third of the distance from its apex to base; surface of elytra covered with long stiff flavo-testaceous pubescence; under surfaces black, except on the two last segments of the abdomen (which are testaceous), with pubescence like that of the elytra; anterior legs testaceous, femora and tibia of posterior legs black, the tarsi fuscous; anal style testaceous. Head a little narrower than the prothorax, finely punctured. Antennae filiform; covered with bristle-like hairs; the first and second joints equal in length, rather robust; the third and fourth joints each one-third shorter and a little narrower than the second; the fifth to tenth joints about equal in length, each one-third longer and wider than the fourth; eleventh joint oval, longer than the tenth. Palpi with the last joint nearly oval. Prothorax finely and sparsely punctured; about as long as wide, widest a little in advance of the base, which is truncate in front of scutellum; its sides slightly

² Trans. Am. Ent. Soc. X. 1882, pp. 81, 83.

³ Proc. Amer. Philos. Soc. XVII., 1878, p. 428.

⁴ Specimens examined from Iowa, Illinois, Ohio, Maryland, New Jersey, New York and Massachusetts.

converging toward the apex. Elytra nearly parallel on anterior two-thirds, tapering thence to apex; rather coarsely scabrose over the entire surface; anal style 3 mm.

A single specimen, presumably a female, collected by the writer at Miller, Indiana, on August 29, retained in the writer's collection.

This species seems most nearly allied to *Mordellistena semiusta* Lec., differing in having the prothorax black, with a small ferruginous spot on the apical angle; in having the humeral spot on the elytra distinct, and in the development of a subapical pale spot. It should be listed immediately following *Mordellistena ustulata*.

6. *Mordellistena syntaenia*, sp. nov.

Hind tibia with two ridges in male, with three in female; first joint of hind tarsus with three, the second with two ridges in both sexes; all ridges short and somewhat indistinct.

Body linear. Head black, with rather long and coarse sericeous-cinereous pubescence; antennae black, with the four basal joints fusco-ferruginous; mouth-parts fusco-ferruginous; prothorax black, with rather long coarse sericeous pubescence; elytra black, each elytron with two sericeous-cinereous stripes or vittae; one located near the suture, widening basally and there dividing to enclose a narrow black streak in the center; the other vitta narrow, located near the margin, connected with the first at the base and apex, enclosing a broad black space on the disc, and leaving the suture and lateral margin black; under surfaces black, covered with cinereous pubescence; anterior legs ferruginous, becoming fuscous on apex of the femora and tarsi; middle legs a little darker; posterior legs black, becoming ferruginous on the tibial spurs. Head a little narrower than thorax, closely and finely punctured. Antennae filiform, reaching nearly to base of thorax; the first and second joints equal in length; the third a little shorter than the second; the fourth one-third longer and a little broader than the third; the fifth one-third longer and a little broader than the fourth; the sixth to tenth joints about equal in length; the eleventh longer than the tenth. Apical joint of maxillary palpi securiform; prothorax about as long as wide, its base as wide as that of the elytra, widest at middle, its sides evenly rounded and slightly converging to apex; base truncate or very slightly emarginate at middle; elytra widest at middle and slightly tapering to apex, finely and closely punctured. The inner edges of the femora and tibiae of the anterior legs bear long erect setae in the male, but only fine hairs in the female; inner spur of posterior legs one-third longer than the other. Anal style long and slender. Length to end of the elytra 3 mm., to end of the anal style 4 mm.

Twenty-three specimens examined: nine from Duxbury, Mass., June 27; four from Framingham, Mass., June 3 to July 4; six from Sherborn, Mass., May 25 to June 22; one from Natick, Mass., June 20; two from Southboro, Mass., June 9, and one from Dummerston, Vt., July 14, all collected by Mr. C. A. Frost. The male holotype and female allotype, from Duxbury, Massachusetts, are placed in the writer's collection; paratypes in the collection of Mr. C. A. Frost.

The species is unlike all other North American forms of the genus, being

readily distinguishable by the elytral markings and the ferruginous anterior legs. The ridges on the posterior legs vary much in size, in many specimens being small and faintly indicated; some specimens show slight indications of rudimentary additional ridges.

On account of the sexual difference in the number of ridges, the writer suggests that this species be placed in taxonomic sequence after *Mordellistena inornata*.

7. ***Mordellistena incomunis*, sp. nov.**

Hind tibia with three rather strongly marked oblique ridges; first joint of hind tarsi with four, the second with three, small oblique ridges.

Body linear, slightly cuneiform. Color black, showing in certain lights a blueish-green iridescent lustre; head and prothorax rather sparsely covered with yellowish-brown pubescence; antennae black; elytra with golden-yellow pubescence along the suture, and on a rather broad vitta on each elytron, extending from near the humeral angle to a little beyond the middle; under surfaces black, with sparse yellowish-brown pubescence; legs black. Head a little narrower than prothorax, finely punctured; eyes small. Antennae filiform, or slightly serrate; third joint one-fourth shorter and a little narrower than the fourth, fifth to tenth joints nearly equal in length and width, each being very little longer than the fourth; eleventh joint elongate ovate, one-fourth longer than the tenth. Maxillary palpi scalene-triangular. Prothorax finely punctured, as broad as long; widest one-fourth the distance from base to apex; slightly rounded and converging toward apex; the base at middle (in front of scutellum), truncate; scutellum triangular; elytra very little wider than the prothorax, widest at middle, and slightly tapering toward apex; moderately punctured. Inner edge of femora and tibiae of anterior legs with long setae in the male, finely pubescent in the female. Anal style long and very slender, with cinerous pubescence at base. Length to end of the elytra, 3.5 to 4 mm., to end of the anal style 4 to 5 mm.

Four specimens examined: one from Riverside, near Chicago, Illinois, collected on June 27 by Mr. C. Sellinger; one from Sawyer Dunes, Berrien County, Michigan, collected by Mr. T. H. Hubbell, and two from Aweme, Manitoba, Canada, collected on June 19 Mr. Norman Criddle. The male holotype from Riverside, Ill., is deposited in writer's collection; the female allotype from Sawyer Dunes, Berrien Co., Mich., will be placed in the Museum of Zoology, University of Michigan; a paratype in Mr. Criddle's collection.

This species somewhat resembles *Mordellistena suturella* Hel., but differs in having the fourth to tenth antennal joints much shorter, and slightly serrate, rather than elongate-parallel, and in coloration *suturella* shows no trace of a vitta on the disc of the elytra. It should be placed after *Mordellistena aequalis*, *M. conformis* or *M. pulchra*, all of which have same number of ridges on hind legs.

8. ***Mordellistena pulchra* Liljeblad.**

Since the publication of the original description⁵ of this species, the writer has collected twenty-five additional specimens, including males, which have not been described.

⁵ Can. Ent. XLIX., 1917, p. 12.

These specimens were taken from flowers of *Helianthus*, on August 17 and September 6, at Edgebrook, Illinois, near the type-locality of the species.

The two sexes differ very markedly in several respects. The ridges are alike in the two sexes, except that the second joint of the hind tarsus bears two, rather than three, oblique ridges; in some males a rudiment of the third ridge can be distinguished. The males are somewhat darker in color than the females; the prothorax is ferruginous rather than rufous; the median black line is shorter, being restricted to the posterior half of the prothorax; the elytral vitta is narrower and fainter, in some specimens being apparent only at base of the elytra. The inner edge of the anterior femora in the male only bears setae. The males are somewhat shorter and notably slenderer than the females.

NOTES ON THE GENUS GARYPUS IN NORTH AMERICA.
(PSEUDOSCORPIONIDA—CHELIFERIDAE.)

BY JOSEPH C. CHAMBERLIN,

Stanford University, California.

In studying a small collection of these interesting arachnids from the California Academy of Sciences, kindly loaned through the courtesy of Dr. E. P. Van Duzee, I discovered a large *Garypus* from Lower California which is apparently undescribed. There were also representatives of *Chelifer* and *Chelanops* which I believe likewise to be new and will describe in a later paper.

To Mr. G. F. Ferris of Stanford University, for his always willing, kindly criticism and help in preparing this description I wish to extend my sincerest thanks.

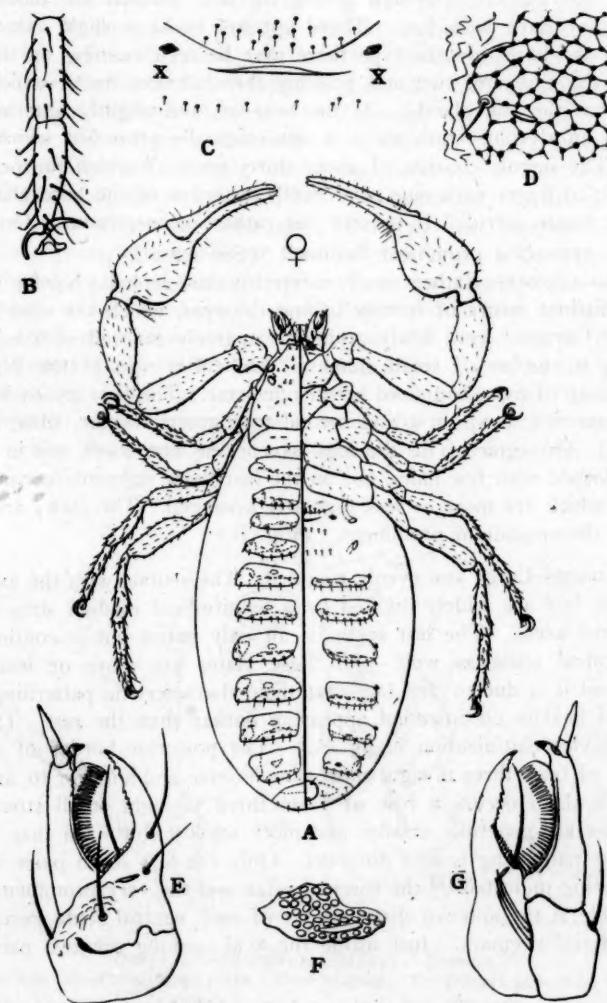
***Garypus giganteus*, sp. nov.**

Female—(Fig. A) *Measurements*. A large species measuring 7.5 mm. in length, including chelicerae. Other measurements may be tabulated:

Anterior margin of cephalothorax	3.7 mm.
Posterior margin of cephalothorax	1.50 mm.
Length of cephalothorax (exclusive of chelicera)	1.60 mm.
Pedipalps (including coxa)	6.55 mm.
First leg (including coxa)	3.50 mm.
Second leg (including coxa)	3.55 mm.
Third leg (including coxa)	4.40 mm.
Fourth leg (including coxa)	5.10 mm.
The length of the individual palpal joints are: coxa, .5 mm.; trochanter, .5 mm.; femur, 1.75 mm.; tibia, 1.5 mm., and claw, 3.3 mm.	

Color. (Alcoholic)—Generally light brownish. Fingers reddish brown; hand light reddish yellow. Remainder of palpi and also legs, light pale brownish. Cephalothorax brown. Abdominal scutae light brown with central darker spot. Ventral abdominal plates light brown; only last seven pairs being visible as the rest are unchitinized and soft. Intersegmental parts and areas surrounding the operculum, very pale brownish.

Morphological characters. *Pedipalpi* moderately long and slender, sparsely clothed with minute simple hairs; fingers distinctly curved, terminated by a stout tooth and provided along their length with a row of minute teeth or serrations. Hand very convex on the inner margin and shorter than the fingers.



GARYPUS GIGANTEUS, NEW SPECIES

(See Page 191)

Tibia about half the width of the hand, convex on its inner edge, but with a gentle concavity at its distal end. Femur not quite so wide as tibia and about the same length, the inner margin being almost straight. Trochanter almost globular.

Chelicerae—(Fig. E, G). Spinnerets long and almost conical in shape, apparently unbranched, although owing to the method of mounting such branching may have been lost. There appears to be a slight constriction or suture near the base. In the type there may be seen running up the movable finger into the spinneret two and possibly three slender ducts, which are presumably from the silk glands. At the base of, and slightly anterior to, each spinneret is an alveolus from which a seta originally arose but which is lost in the type. The serrula consists of about thirty teeth of which the proximal are longest. Fixed finger with nine small teeth exclusive of the hard chitinized tip. The "fixed finger serrula" is present but rather inconspicuous. On each side of the base appears a prominent "stoma." (See remarks).

Cephalothorax—Rather small, sub-triangular, cephalic border emarginate with an indistinct suture or furrow behind the eyes, which are very bright and prominent. Carapace very finely granulate, sparsely covered with minute hairs and bearing a number of small stomata. On either side of the labium is an irregular group of five good sized bristles or setae. The legs are each composed of seven segments; coxa, first and second trochanters, femur, tibia, metatarsus and tarsus. All segments of the legs except the last three are in each case sparingly clothed with fine hairs, but on the last three segments occur numerous stout setae which are more or less regularly arranged. The claws are long and simple and the empodium prominent. (Fig. B.)

Abdomen—Large and evenly rounded. The scutae, with the exception of the first and last are widely divided by a longitudinal median strip and broad intersegmental areas. The last scuta is not only entire but is continuous with the last ventral scuta as well. All these plates are more or less unevenly chitinized and it is due to this fact that their characteristic patterning appears; the areas of heavier chitinization appearing darker than the rest. (See dotted areas of heavier chitinization in fig. A.) The posterior border of each scuta bears a row of from three to eight short, simple setae and anterior to, and roughly parallel with them occurs a row of from three to eight small stomata. The ventral plates are generally smaller and more weakly chitinized than the dorsal ones and the patterning is also different. Only the last seven pairs are visible, the others being indicated by the rows of setae and the very prominent spiracles. Plainly visible at the anterior distal corner of each ventral scuta except the last are the vestigial stigmata. Just inside the anal opening are two pair of small setae.

Skin—(Fig. D). The structure of the skin forming the scutae is very distinct and gives a very characteristic reticulated appearance.

Operculum—(Fig. C.). Just anterior to the genital slit are three rows of short simple setae which probably indicate the first two abdominal segments. Posterior to the opening is a very long narrow chitinized area, then two separate rows of setae and finally the first of the visible plates. The most distinctive

character of this area is, however, the presence of the well marked "cribriform plates." (Fig. A).

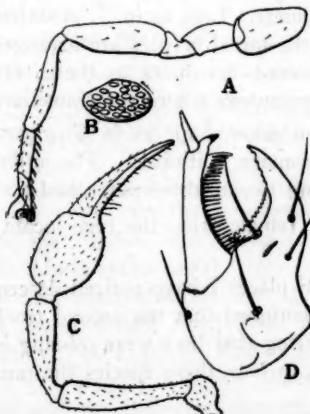
Cribriform Plates—(Fig. F). In this species the cribriform plates are roughly oval or diamond shaped, with about thirty-four "pores" and in addition a small stoma on the posterior edge.

Affinities. This species is rather close to *G. californicus* from which it may readily be separated by its larger size as well as numerous other characters as may be seen by comparing with the brief redescription of the latter species.

Material. A single adult female from Turtle Bay, Lower California, Mexico, collected by the U.S.S. Albatross, April 20, 1906, and deposited in the collection of the California Academy of Sciences, San Francisco, California.

Remarks. The type is mounted on a slide in canada balsam and was first boiled in KOH and stained. Mounting specimens in this way is apt to destroy the shape of the spinnerets, but the numerous characters which are gained more than offset this handicap. Many of the features noted in the preceding description are invisible or practically so in any other form of mount.

In the above description I have used several terms which it might be well to explain. The "fixed finger serrula" referred to is a serrula-like set of transparent teeth or serrations extending from the large seta at the junction of the two fingers along the keel of the fixed finger almost to the basal tooth. I have been unable to find any former mention of this character. It also appears in *G. californicus* where it is very prominent. Its occurrence is very probably generic as is also the characteristic arrangement of the five large dorsal setae. (Figs. E, G and text fig. D).



Garypus californicus (Banks). Female.
A—Third leg. B—Cribriform plate. C—Pedipalp. D—Dorsal aspect of chelicera.

At the base of the fixed finger of the chelicerae on both dorsal and ventral sides, is a long slit-like opening, which, from its resemblance to a superficially similar structure in plants, I have termed a "stoma." These stomata are characteristic of all the species of the order which I have studied and are to be found almost anywhere on the chitinized areas of the body, but more particularly on the abdominal scutae. What they really are I have been unable to discover,

but possibly the openings of lyriform organs or, perhaps, glands. While characteristic of all the species they vary greatly in size, number and position according to the species. They are very probably variable within certain limits in the species also, at least I would suspect so judging from studies of *Chelifer scabriculus* and *C. fuscipes*.

The structures which I have referred to under the term "cribriform plates" are small chitinized plates which are apparently perforated with numerous pores. They occur near the genital slit of the *females* of various species in the family Cheliferidae and vary greatly in size, shape and degree of chitinization. I have found them most prominent in *Chelifer scabriculus* where they are almost perfectly round and rather close together. Whether they occur in other families I cannot say as I have not seen enough material to judge.

Garypus californicus (Banks).

1909—*Garypus californicus* (Banks), Can. Ent. 41:305.

1911—*Garypus californicus* (Banks). Pom. Jour. Ent., 3:635:f210-B.

1917—*Garypus californicus* (Banks). Moore. Jour. Ent. Zool., 9:26:1

Pedipalps—(Text fig. C). Palpi have almost same proportions as in *G. giganteus*, but the inner margin of the hand is not so swollen, the inner margin of the tibia is straight as is also the inner margin of the femur.

Chelicerae—(Text fig. D). The spinnerets are long conical and as in *G. giganteus* apparently unbranched, the serrula has about twenty-five teeth, the fixed finger is very strongly curved, and the fixed finger serrula is very prominent, having about twelve or thirteen teeth.

Cephalothorax and legs—(Text fig. A). Cephalothorax sub-triangular with anterior border emarginate. Legs as in *G. giganteus* all composed of seven segments. In this species the tarsal bristles are arranged in regular rows. The change from sparsely scattered fine hairs to these tarsal setae takes place at the metatarsus, unlike *G. giganteus* where the transition is at the tibia.

Abdomen—Much the same shape as in *G. giganteus* except that all the ventral scutae are slightly more chitinized. The cribriform plates (Fig. B) are oval in shape, with about twenty-three pores and no stoma.

Material. An adult female from the type locality; Santa Clara County, California.

Remarks. In several places I have noticed descriptions of species in this genus where the fact is mentioned that the second trochanter is present in the posterior pair of legs, inferring that they were missing in the two anterior pair. I think this is a mistake as in both these species the number of segments is the same in all the legs.

OTHER NORTH AMERICAN SPECIES.

Two other species of this genus are described from North America. These are *Garypus floridensis* and *G. granulatus*, both of which were described by Dr. Nathan Banks. The four North American species may be separated by the following key, which is based in part upon the literature.

1. Anterior margin of cephalothorax emarginate, fingers as long or longer than hand, length 4 mm. or greater 2
 Anterior margin of the cephalothorax not emarginate, fingers shorter than

Garypus floridensis (Banks).

1895—*Garypus floridensis* (Banks), Journ. N. Y. Ent. Soc., 3:9.

This species was described from near St. Lucie, Indian River, Florida, where it was collected under drift-wood on the ocean beach.

Garypus granulatus (Banks).

1891—*Garypus granulatus* (Banks).
Garypus granulatus (Banks), Can. Ent., 23:163.

1895—*Garypus granulatus* (Banks). Journ. N. Y. Ent. Soc., 3:9.

This small species was discovered in the crevices of a cliff at Ithaca, N.Y.

EXPLANATION OF PLATE VII.

A=Left half dorsal; right half ventral.

B—Dorsal aspect of tarsus of second leg.

B—Dorsal aspect
C—Operculum

D=Distal corner of third dorsal scuta

D—Distal corner of third dorsum
E—Dorsal aspect of chelicera

E—Dorsal aspect of
F—Scribriform plate

G—Ventral aspect of chelicera.

SAMIA EURYALUS BDV., THE CORRECT NAME FOR THE
CALIFORNIAN SILK WORM MOTH

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A curious error has crept into the synonymy of the well-known *Samia* species of California and the Pacific Coast which, for the past fifteen years, has been generally known as *Samia rubra* Behr.

The species was first mentioned by Dr. Behr at the meeting of the California Academy of Sciences held April 30th, 1855, and is reported in the Proceedings of that Society, Vol. I., p. 47 (Edition of 1873, p. 46) as follows:—"Dr. Behr presented a drawing of a native silk-worm of California with a specimen of the cocoon and the following description: *Saturnia rubra*, collare album, etc. . . . It is found on the *Ceanothus thyrsiflorus*" Owing to an oversight of the author or of the printer, no actual name for the species was proposed, the adjective "rubra" being merely part of the Latin diagnosis (as can be readily seen by the difference in type) and by no means to be employed as the name of the species. Dr. Behr several times expressed himself to this effect in letters to contemporary entomologists.

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On pages 68-69 (72 of Edition II.) of the same Proceedings, we find this note under date of Aug. 27th, 1855:—"Donations to the Cabinet. From Dr. Behr a specimen of the Cal. silk-worm (*Saturnia ceanothi* Behr)." There is no doubt as to the application of the name nor, I think, to its validity; the name *ceanothi* Behr cannot, however, under the most favorable conditions, be considered to have been published prior to the first week of September, 1855.

Meanwhile, in the Bulletin Soc. Ent. France for 1855, p. XXXII., we find recorded that Dr. Boisduval exhibited certain Californian Lepidoptera which he proposed describing at a later date; the name of each species, together with a very short diagnosis, was given, sufficient, however, I believe, to establish the validity of the names. Among the species mentioned was *Saturnia euryalus*, which is obviously the same species to which Behr applied the name *ceanothi*, in fact in Lep. de la Californie, p. 83, 1869, Boisduval mentions this fact, giving erroneously priority to *ceanothi* Behr.

Page XXXII. of the Bulletin Soc. Ent. France was issued with the first part of the Annales for that year and deals with the meetings held from January to March. Dr. N. Banks, who has kindly examined some of the current publications with a view to ascertaining the date on which Part I. of the Annales was published writes me that unfortunately no record of its reception is to be found either in the Transactions Ent. Soc. London or the Stettiner Entom. Zeitschrift. However, in the Proceedings of the meeting of the London Entomological Society, held Sept. 3rd, 1855, the receipt of a reprint entitled "Lettre addressée a M. Jacquelin du Val, etc.," is recorded; this reprint is from p. XXVI. of the same Bulletin and was read at the same meeting at which Boisduval presented his specimens. It must have been received by the Society between Aug. 6th and Sept. 3rd. It seems reasonable therefore to suppose that Part I. of the Annales for 1855 must, at the very latest, have appeared some time in August; as a matter of fact it probably was issued several months earlier.

Euryalus Bd. will therefore clearly take priority over *ceanothi* Behr as the name for the Californian Silk-worm Moth, the name *rubra*, as used by later entomologists, having no valid standing.

CRANE-FLIES OF NEW YORK.

Cornell University has just issued Part II. of "The Crane-Flies of New York" by Charles Paul Alexander. This part, which is published as Memoir 38 of the University Agricultural Experiment Station, deals with the biology and phylogeny of the crane-flies and gives representative crane-fly life histories, external and internal morphology, and concludes with keys and descriptions. The monograph contains about 450 pages.

To persons interested in research in the field covered by the Memoir, copies will be sent as long as the supply lasts. Ask for M-38, and address requests to Office of Publication, College of Agriculture, Ithaca, New York.

Dr. C. L. Metcalf, for the past seven years Professor of Entomology in Ohio State University, has resigned to accept the position of Professor of Entomology and Head of the Department of Entomology in the University of Illinois. He should be addressed in care of the university at Urbana, Illinois, after September first.

Mailed, Oct. 31st, 1921.

